DRAFT

OSHA'S PROPOSED RULE ON ETS

OSHA states that the "primary objective of the tobacco smoke provision is to eliminate the nonsmoker's exposure to ETS. Under the Proposed Rule, firms will have the option of either banning smoking of tobacco products or permitting smoking only in designated areas." 59 Fed Reg. 16016. The designated smoking area must be completely enclosed with a separate exhaust directly to the outside. In addition, the area must be negatively pressurized to prohibit exposure of any ETS constituent outside the designated area. 59 Fed Reg. 16029. The Proposed Rule on ETS, according to OSHA, reduces "significant risk of material health impairment to the extent feasible." 59 Fed Reg. 16013.

The Proposed Rule, however, does not explain why the complete elimination of ETS is required or how the studies that OSHA selected for its analysis of significant risk warrant the complete elimination of ETS. According to a recent court opinion (AFL-CIO v. OSHA, 965 F.2d 962, *975), OSHA's determination that a new standard is "reasonably necessary or appropriate" and that it "most adequately assures . . . that no employee will suffer material impairment of health or functional capacity, . . . necessarily requires some assessment of the level at which significant risk of harm is eliminated or substantially reduced." OSHA does not provide an assessment of the level of "significant

risk of harm." That is because its analysis of significant risk for ETS is based upon two epidemiologic studies that are inconsistent with the body of evidence on health effects from workplace exposures to ETS, and from which estimated risks are generated without reference to actual ambient measures of ETS exposures.

OSHA provides no reason for setting its ETS standard at "zero" exposure. The zero level of exposure does not follow from OSHA's analysis of significant risk. It does not follow from OSHA's contention that its ventilation-based IAQ Standard will not be effective in the removal and dilution of ETS constituents because "air exchange rates in non-industrial workplaces are not designed to control the risks of ETS exposure," 59 Fed Reg. 15991, or because "the carcinogenicity of ETS discounts the use of general ventilation as an engineering control for this contaminant." 59 Fed Reg. 15992. As discussed in Section I of this submission, ordinary air in public places and workplaces contains many of the same substances imputed to ETS, in the complete absence of smoking. Such substances, some of which are designated as "carcinogens" by OSHA, are produced by many common sources, and complete removal of ETS from the ambient air will not eliminate exposures to them. Moreover, some individual constituents found in both indoor air and ETS are already regulated by OSHA. OSHA establishes permissible exposure levels to such airborne substances presumably at levels

protective of employee health and at which no significant risk of material impairment exists. The levels of exposure are typically far greater than any actually generated by ETS. OSHA's own Proposed Rule on IAQ does not call for the complete elimination of such substances, some of which are "carcinogens," but for their reduction to an "acceptable" level by ventilation.

OSHA has not demonstrated the extent to which ETS contributes to constituent levels above background levels in the workplace, it has not made a determination of "significant" risk for ambient ETS exposure levels, and it fails to prove that ETS cannot be addressed through proper ventilation, as spelled out in its own IAQ Standard.

While the complete elimination of ETS is achievable through a smoking ban,* the complete elimination of the same constituents from other sources is not possible. If a comprehensive indoor air quality standard were truly the goal of OSHA's Proposed Rules on IAQ and ETS, then it would have explored alternatives that are functionally equivalent in effectiveness to smoking bans in the reduction of exposures to ETS -- alternatives

---

*. OSHA's rulemaking on ETS is directed at stopping the smoker rather than "protecting" the nonsmoker. A smoking ban with the express purpose of altering smoking behavior may be seen as an attempt at "social engineering" and clearly is not, and ought not to be, within OSHA's regulatory framework.

that would not seek to alter the behavior of the smoking workforce. A discussion of alternatives to smoking bans and/or separately ventilated smoking rooms follows below.

(1) **Current Design And Operation Criteria For Ventilation Provide For The Effective Dilution And Removal Of ETS Constituents From Workplaces In Which Smoking Is Unrestricted; A Ventilation Standard, ASHRAE 62-1989, Has Been Incorporated Into The Major Building Codes In The U.S.; Since 1990, The Standard Has Provided Design And Operations Criteria For Ventilation Systems In New, Remodeled And Renovated Buildings; The Standard Has Been Incorporated By Reference Into OSHA's Proposed Rule On IAQ**

The Proposed Rule states, without justification, that ventilation cannot be used to address the "risks" purportedly associated with exposures to ETS. The Proposed Rule specifically cites the "failure" of ASHRAE Standard 62-1989 in the "elimination" of "risks" from ETS exposures. 59 Fed Reg. 15992. While ASHRAE Standard 62-1989 does not explicitly address purported "risks" from indoor air exposures, it establishes ventilation rates for various locations in order to "control carbon dioxide and other contaminants with an adequate margin of safety, and to account for variations among people, varied activity levels, and a moderate amount of smoking" (emphasis added).[1] The Chairman of the ASHRAE Standards Project Committee for Standard 62-1981, Mr. John Janssen, writes:

> Laboratory research at Yale University and at the Technical University of Denmark has shown that 15 cfm of outdoor air will dilute occupant odors to a level acceptable to at least 80 percent of the people entering an occupied space from outdoors. Research on tobacco smoke odor at Yale's John B. Pierce Laboratory has also shown that with today's reduced smoking rate 15 cfm of outdoor air will dilute environmental tobacco smoke to a level acceptable to 70 percent of the people entering an occupied space where about 27 percent of the occupants smoke at a rate of 1.25 cigarettes per hour. This equates to one pack per 16 hour day. Other calculations on the tobacco smoke perception of nonsmoking occupants in a room for 15 minutes with smokers show that nonsmoking occupants will register 90 percent acceptance under the assumed conditions. Thus, Standard 62-1989 appears to be able to control tobacco smoke odor under minimum smoking conditions.[2]

The minimum ventilation rate recommended by ASHRAE Standard 62-1989, 15 cfm outside air/person, is the level at which odors, metabolic byproducts, and ETS are effectively diluted and removed. (3-440).[3-5] The effectiveness of the minimum ventilation rate for the dilution of ETS has been evaluated by scientists.[6-8] In 1990, Pedelty and Holcomb demonstrated that air quality in areas where smoking is permitted ad lib does not differ significantly from the quality of air in nonsmoking areas, where both areas are supplied with the minimum outdoor air ventilation rates recommended in ASHRAE 62-1989.[6]

In their review of ETS-related air quality monitoring in different workplaces under various smoking conditions, researchers

from TDSA Ltd. conclude "in office areas in which (a) smoking is allowed and (b) outside air ventilation rates meet or exceed the ASHRAE Ventilation Standard, nicotine concentrations have typically been less than 5 ug/m^3 and respirable suspended particles have ranged between 20 ug/m^3 and 60 ug/m^3. (3-1073).[7]

In their submission to the OSHA RFI Docket, scientists summarized the results of their paper on the measurement of ETS in 585 offices. (3-1053). The authors write:

> Computer analysis shows that when "blind-folded" for presence or absence of smokers, in most cases realistic smoking levels do not significantly influence the aspects of air quality that were measured, and spillover from smoking areas into nonsmoking areas appears to be minimal. This work further reinforces the position the American Society of Heating, Refrigerating and Air-Conditioning Engineers has taken on ETS in office buildings in ASHRAE Standard 62-1989, that acceptable air quality can be maintained in properly ventilated offices with a moderate amount of smoking even without smoker segregation.

Professor Alan Hedge offers the following observation on the basis of his extensive experience in monitoring ETS constituents during investigations of sick-building syndrome: "Our data show that modern ventilation systems are capable of diluting the small pollutant loads from smoking at the levels which we observe, without necessarily exposing nonsmokers to significantly elevated levels of indoor air pollutants." (3-955).

Company scientists from R.J. Reynolds (RJR) reported on a recently completed study of four office buildings (3-1087).[8] Two of the buildings investigated had a policy of unrestricted smoking and, in two other buildings, smoking was restricted to separately-exhausted lounges. Regardless of smoking policy, RJR reports that ventilation and indoor air quality indicators were "well within applicable standards." The authors write:

> In summary this study demonstrates conclusively (a) that with a HVAC system that is adequately designed, operated in accordance with current ASHRAE standards and properly maintained, all indicators for ETS are at extremely low, de minimis levels, even in the presence of substantial smoking activity, and (b) that such smoking activity has a negligible effect on contaminant levels in buildings where smoking is unrestricted. (3-10-87)

They conclude:

> RJR believes, based on its own detailed research and the consistent results of other workplace assessments, that a properly designed and maintained HVAC system that is operated in accordance with the ventilation rate procedures of the ASHRAE Standard 62-1989, will be effective in assuring that exposures to ETS will be de minimis.

Thus, in buildings meeting the ventilation rates specified in ASHRAE 62-1989, return air from areas in which smoking is permitted will be diluted by outside air, and the mixture of return and outside air will be filtered prior to returning to the supply system. The dilution factor accounts for the low levels of

ETS constituents measured in nonsmoking areas, as documented in the above studies.

(2) **Simple Physical Separation Of Smokers And Nonsmokers Has Been Effective In The Reduction Of Nonsmoker Exposure To ETS; Simple Spatial Separation Of Smokers And Nonsmokers, Even Under Conditions Of Recirculated Ventilation, Effectively Minimizes ETS Exposure For Nonsmokers; Data Do Not Support A Significant Reduction In ETS Exposures Beyond Adequate Ventilation And/Or Simple Separation Of Smokers and Nonsmokers**

Scientific studies indicate that the simple physical separation of smokers and nonsmokers, even under a shared ventilation system with recirculated air, can effectively minimize nonsmoker exposures to ETS.[7, 9-20] Other studies indicate that smoking bans and/or separately ventilated smoking areas do not significantly reduce ETS exposures beyond reductions achieved through simple separation and/or adequate ventilation.[8, 9, 12-14, 17]

A 1990 study by Vaughn and Hammond, cited in the Proposed Rule (59 Fed. Reg. 15991), examined the impact of smoking policies on ETS constituent levels in a high-rise building.[9] The authors reported an 80 percent reduction in exposure to ETS constituents in nonsmoking workareas after designation of a smoking area on a floor that utilized a common (recirculating) air-handling system. Exposure levels to nicotine in nonsmoking workareas prior to the designation of the smoking area were 2.0 ug/m^3; after institution

of the smoking policy, nicotine levels dropped to 0.1-0.3 ug/m^3. A complete ban of smoking on another floor in the building produced a 95+ percent reduction in ETS constituents, only a 15 percent exposure reduction beyond simple separation of smokers and nonsmokers.[9]

Another study of a smoking-restricted office building reported that ambient nicotine in nonsmoking areas was virtually undetectable.[10] Smoking was restricted to designated areas with local air filtration systems. The authors concluded that spatial restrictions are "effective in minimizing the impact of environmental tobacco smoke on indoor air quality . . . ."[10]

In a similar study, Canadian researchers compared measured ETS constituents in offices where smoking was regulated and unregulated.[7, 11] They reported no significant differences in average ETS constituent levels between nonsmoking offices that received recirculated air from designated smoking areas, and nonsmoking offices that did not receive recirculated air. Nicotine concentrations reported for nonsmoking areas were only marginally above limits of detection and quantitation; there were no measurable differences in particles or carbon monoxide levels in nonsmoking areas that did or did not receive recirculated air from smoking areas. The researchers concluded:

> The results indicate that the provision of a designated, but not separately ventilated, smoking area can effectively eliminate or drastically reduce most components of environmental tobacco smoke for nonsmoking offices.[11]

In 1991, Hedge, et al. examined the effects of smoking policies on indoor air quality in 18 private-sector buildings.[12] The study covered over 3,000 workers. They concluded:

> Comparison of all open-office sites between policies showed no significant differences in levels of carbon monoxide, carbon dioxide, formaldehyde or respirable particulates. . . . Smoking policy had a relatively small effect on IAQ for the pollutants measured. For most of these pollutants, there were no significant differences in concentrations among offices in SP (smoking-prohibited) buildings, nonsmoking office areas in RF (smoking restricted to rooms with local filtration), RSV (smoking restricted to rooms with separate ventilation) and RMP (smoking restricted to rooms with no location air treatment) buildings, and office areas in RWS (smoking restricted to open-plan cubicle workstations and enclosed office) buildings. There was a significant effect of smoking policy on UVPM and formaldehyde in these office areas . . . however, all concentrations of UVPM and formaldehyde were low.

A 1993 follow-up study by the same authors compared ETS constituent levels in 27 office buildings under five different kinds of smoking policies.[13] The smoking policies ranged from unrestricted smoking to the complete prohibition of smoking. The authors report that nicotine and tobacco-specific particles (UVPM-RSP) were measurable in offices that permitted smoking, but

exposures to other airborne substances were similar across all buildings, regardless of smoking policy. The authors estimated that a typical nonsmoker would be exposed to the nicotine equivalent of approximately three cigarettes per year in open-plan offices with smoking restricted to enclosed parameter offices. Simple separation of smokers and nonsmokers under a common ventilation system was estimated to result in nicotine exposure levels of no more than five cigarette equivalents per year.

A 1993 Canadian study compared exposures to ETS constituents in three buildings before and after smoking bans.[14] The authors reported a significant reduction in average levels of volatile organic compounds in the buildings after the smoking ban, a result they could not explain and one that is inconsistent with other studies that demonstrate no significant contributions from ETS to indoor levels of total volatile organic compounds.[15, 16] The smoking ban, however, had no significant effect on overall exposures to carbon monoxide or particles, or on cotinine levels in body fluids of nonsmokers.

Similarly, Proctor (1987) monitored ETS constituents before and after a smoking ban on public transportation in the United Kingdom.[17] While nicotine concentrations decreased from 7 ug/m^3 to 3 ug/m^3 in nonsmoking compartments after the ban, particulate and carbon monoxide levels remained unchanged. This

suggests that ETS contributions to levels of particulate and CO in public transportation are not significant.

In another study by Proctor and co-workers (1989), the researchers measured nicotine, RSP, carbon monoxide, carbon dioxide, and volatile organic compounds in the air of smokers' and nonsmokers' offices.[15] The data indicate little nonsmoker exposure to various ETS constituents through simple separation. The average UVPM-RSP level in nonsmokers' offices was 8.8 ug/m^3; the median nicotine value was less than 1 ug/m^3. Carbon monoxide and carbon dioxide levels did not differ appreciably between smokers' and nonsmokers' offices. Overall, levels of volatile organic compounds did not differ significantly between smokers' and nonsmokers' offices.

Bayer and Black (1987) reached a similar conclusion in their investigation of volatile organic compound levels in smokers' and nonsmokers' offices.[16] They noted that although differences in nicotine concentrations were measurable for offices of smokers compared with nonsmokers, no significant differences in volatile organic compounds were discerned in smokers' and nonsmokers' offices. The researchers observed that "it was not possible" to correlate volatile organic compounds with ETS or to attribute the source of various volatile organics to ETS.

A 1989 study performed for the U.S. Department of Transportation on ETS constituent levels aboard commercial aircraft indicates the overall effectiveness of simple separation of smokers and nonsmokers in the minimization of ETS exposures.[18] This study is cited in the Proposed Rule (59 Fed Reg. 15991). The researchers reported an average level of 0.11 ug/m^3 nicotine in nonsmoking sections for their sample of 61 domestic commercial flights. The average level was over 100 times lower than that measured in smoking sections; it is equivalent to 1/8000 the nicotine delivery of a single cigarette.

In the largest study of its kind, researchers reported measurements of ETS constituents in 585 offices, many of which were conventional office settings with simple separation of smokers and nonsmokers under common air-handling systems and recirculated air.[19] The researchers concluded that: "[I]n most cases realistic smoking levels do not significantly influence the aspects of air quality that were measured, and spill-over from smoking areas to nonsmoking areas appears to be minimal." "Spill-over" of tobacco smoke constituents was reported in only four percent of the nonsmoking areas.

Lambert, et al. (1993) examined differences in nicotine and RSP levels in the nonsmoking and smoking sections of restaurants.[20] Simple separation of smokers and nonsmokers in

restaurants resulted in substantial reductions of exposure to RSP and nicotine for nonsmokers. Nicotine concentrations averaged 65 percent lower in nonsmoking sections than in smoking sections; RSP concentrations were 40 percent lower. The average concentration of nicotine in smoking areas was 3.2 ug/m^3 compared with 1.0 ug/m^3 in nonsmoking areas. The difference between average RSP levels in smoking and nonsmoking sections was 26 ug/m^3, a level consistent with those reported for the contribution of ETS in homes and in offices with smokers. (See Table V, Section II)

The studies reviewed above contain data regarding the low levels of ETS constituents in nonsmoking areas under conditions of simple separation of smokers and nonsmokers with recirculation of ventilation air. Data reported in those studies indicate that ETS constituent levels in nonsmoking areas in buildings where smoking is permitted are often only slightly above limits of detection and quantitation, and often statistically indistinguishable from "background" levels of such constituents found in buildings in which smoking is altogether prohibited. The data support the contention that simple physical separation of smokers and nonsmokers effectively reduces and minimizes ETS exposure in nonsmoking areas, even under conditions of recirculated ventilation.

There are substantial data, submitted to the OSHA RFI docket on IAQ and reviewed in this submission, that indicate that typical workplace exposures to ETS constituents are low and reducible to de minimis levels through the simple physical separation of smokers and nonsmokers in conjunction with the current ventilation rates adopted in OSHA's Proposed Rule on IAQ. The Proposed Rule provides no discussion or scientific data that would support a finding that ETS is related to any material health impairment at exposure levels encountered through simple separation and/or adequate ventilation.

3. Negative Air Pressure Zones; If Physical Grouping Of Smokers And Nonsmokers In Discreet Areas Is Desired By Employers, Prevailing Air Circulation Currents And Routes Of Supply And Exhaust Air Should Be Considered; If Possible, Smoking Areas Should Be Placed Near Existing Exhausts So That Air Movement Will Be Directed From Nonsmoking To Smoking Areas, Thereby Minimizing Possible Migration Of Tobacco Smoke From Smoking Areas

According to Hayward, et al. (1993), the effectiveness of a designated smoking area for controlling exposure to ETS in nonsmoking areas is determined by two basic factors.[21] The first requires the successful dilution and removal of ETS constituents within the smoking area. The ventilation rate, either through outside air or transfer air (the air from other zones within the building), is the most critical determinant for the dilution and

removal of ETS constituents. Outside air should be supplied at rates designated by ASHRAE Standard 62-1989.

A second factor related to the movement of ETS constituents from smoking areas to nonsmoking areas depends upon airflows within the structure.[21] Airflow is affected by the existence of physical barriers such as walls or partitions, as well as by air pressure relationships within the building. For a designated smoking area without partitions, the simple location of smokers near existing exhausts and the designation of nonsmoking areas near supply air diffusers will prevent movement of ETS constituents into nonsmoking areas. Airflow will be directed from the nonsmoking or supply air areas into smoking areas, thereby preventing the air from the smoking area from re-entering that of the nonsmoking area. This technique, known as "air pressure zoning," has been described in a recent publication for design engineers:

> Air generally flows from areas of higher air pressure to areas of lower air pressure, from positive pressure in the direction of negative pressure. Using this simple concept, areas set aside for nonsmokers can be maintained at a slight relative positive pressure, while areas set aside for smokers can be maintained at a slight negative relative air pressure. This will produce a slight airflow from the nonsmoking area into the smoking area, keeping the air from the smoking area from mixing with that of the nonsmoking area. Through thoughtful planning and carefully supervised and tested balancing of the HVAC system, the

preferences of both smokers and nonsmokers can be accommodated without any additional cost to building operations.[22]

Air pressure zoning involves the use of existing ventilation systems, e.g., supply and exhausts within a building, and will not influence capital costs or operating efficiencies for a building.

An alternative to the separate smoking area required in the Proposed Rule (i.e., an enclosed space with dedicated exhaust under negative pressure) utilizes the theory of negative pressure and the use of transfer air, which is air drawn directly from other parts of an occupied space. The use of transfer air in a practical smoking lounge design is permitted under ASHRAE Standard 62-1989. The lounge would be ventilated in a way similar to the way restrooms are ventilated and exhausted. Restrooms in public buildings are equipped with exhaust ventilation for the removal of odors, etc. The restroom often draws its supply air from adjacent areas such as corridors that are close to the restroom. The rooms adjacent to the restroom are not fitted with comparable exhaust capabilities. The exhaust air from the restroom creates a negative pressure relative to its adjoining areas. Air is thus "transferred" from adjacent areas of positive pressure into the restrooms and, if the exhaust is working properly, the result is the creation of a negative pressure zone.

The 1993 publication by Hayward, et al. examined the effect of negative pressurization on movement of ETS constituents in three separate buildings.[21] In one of the buildings, the use of a small exhaust fan in the smoking area dramatically reduced migration of ETS constituents into nonsmoking areas. Exposures to nicotine and RSP in nonsmoking areas were reduced below the limit of quantitation. In a second building, the effects of negative pressurization were less dramatic because the ventilation was very effective from the outset in removing and diluting ETS constituents. A third building was not negatively pressurized in smoking areas and nonsmoker exposure to ETS constituents was greater than in buildings (1) and (2).

In 1993, Light and Gay measured nicotine levels in two office buildings with a variety of areas designated for smoking.[23] Nicotine was below the level of detection (less than 0.7 ug/m^3) in most of the sites measured. The authors concluded: "Within the sensitivity of the tests and observations performed, exposure was not documented from the recirculation of air even though many smoking areas were not exhausted to the outside. This suggests that there was little, if any, hazard under the conditions evaluated in areas potentially receiving recirculated ETS but not immediately adjacent to smoking." They reported that "positive pressurization of smoking rooms" led to "intermittent nonsmoker exposure in immediately adjoining areas." If the smoking areas

were negatively pressurized, no detectable exposure to ETS constituents occurred adjacent to smoking areas.

4. Feasibility of OSHA's Proposed Rule on ETS

According to OSHA, "the primary objective of the tobacco smoke provision [of the Proposed Rule] is to eliminate the nonsmoker's exposure to ETS." 59 Fed Reg. 16016. OSHA further states: "Under the Proposed Rule, firms will have the option of either banning smoking of tobacco products or permitting smoking only in designated areas." 59 Fed Reg. 16016. The Proposed Rule requires that designated smoking areas be enclosed, exhausted directly to the outside and maintained under negative pressure. 59 Fed Reg. 16032.

Under OSHA's Proposed Rule for ETS, constituents imputed to ETS will be "eliminated" from the workplace, while exposures to the same constituents from other sources will be minimized to presumably acceptable levels by the ventilation-based Proposed Rule for IAQ. The foregoing analysis clearly demonstrates that: (1) ETS constituent levels in typical workplaces are low and nonsmoker exposure to ETS constituents is minimal; (2) simple physical separation of smokers and nonsmokers in the workplace provides for significant reductions of already minimal exposures to ETS constituents; (3) adequate ventilation effectively dilutes and

removes ETS constituent levels to the extent that levels will often fall below levels of detection or quantitation and will not differ significantly from background levels of constituents generated by other sources; and (4) the negative pressurization of smoking areas will prevent "migration" or "spillover" of ETS constituents into nonsmoking areas.

OSHA's proposal to completely eliminate ETS constituents is a regulation that seeks to modify already insignificant levels of ETS exposure. Alternatives (2)-(4) above were not considered by OSHA, yet they are equivalent in effectiveness to OSHA's proposed requirement of a separately enclosed, separately exhausted, and negatively pressurized smoking room. The Proposed Rule will produce only trivial and insignificant reductions in exposures to ETS constituents over provisions (2)-(4) specified above.

OSHA's Proposed Rule on ETS ostensibly provides a choice regarding smoking for the nation's employers: either ban smoking or construct special smoking rooms. However, the choice is not real. The Proposed Rule constitutes a de facto ban on smoking because OSHA trivializes and minimizes the economic and technological feasibility of providing separate rooms for smoking employees. The "option" of providing a separately ventilated smoking room lies with employers (not building owners), even when the employer leases space for his or her business. OSHA clearly

recognizes this impossible scenario in its Proposed Rule, e.g., "since changes in building ventilation systems will be made by landlords, employers may have to negotiate agreements to ensure that they can meet the OSHA Standard. On the requirement for ETS, landlords in turn are likely to pressure employers to ban smoking; thereby forestalling any need for construction of designated smoking rooms." 59 Fed Reg. 16013.

OSHA declares that problems concerning the technological feasibility of the Proposed Rule "are not evident." 59 Fed Reg. 16013, 16023. However, the isolation of smokers in a separate room as required by OSHA's Proposed Rule places additional demands on an existing ventilation system. The Proposed Rule's requirement of a separate exhaust leading directly to the outdoors is not feasible in many buildings.[22] Few existing buildings, particularly high-rise buildings, are amenable to providing exhaust directly to the outdoors from any given location within the building. The option is not technologically feasible in these instances, and the employer, under OSHA's Proposed Rule, would have no choice but to completely ban smoking. The Proposed Rule concedes: "OSHA recognizes that not all establishments will make available designated smoking areas as there may be physical constraints on the option of providing separate ventilation. Such constraints are imposed by the building's design, the building's mechanical ventilation system's capabilities, by cost involved in providing

adequate ventilation, by the occupant use of the building." 59 Fed Reg. 16016.

OSHA has placed the burden of its Proposed Rule on ETS upon the nation's employers by presenting them with a "choice" over which they are not empowered (i.e., to ban smoking or restrict it to a specially ventilated room). For the employer who is not also a building owner, there is no real choice in the matter. For either the tenant or owner of a multi-story building, there may be no "choice" in the matter due to feasibility restrictions. For the small business owner who must lease additional space for a smoking lounge, there may be no "choice" in the matter. For other businesses, retrofit requirements for the construction of an enclosed, separately exhausted and negatively pressurized smoking room may be cost-prohibitive, and the "choice" in the matter disappears. The Proposed Rule does not address these issues.

5. The Minimum Outdoor Air Ventilation Rates Required In OSHA's Proposed Rule On IAQ Are Based On Versions Of ASHRAE Standard 62 (For Ventilation); The Current Ventilation Standard, ASHRAE 62-1989, Provides Minimum Outdoor Air Ventilation Rates For ETS; The Precursor Standard, 62-1973, Specified Recommended Ventilation Rates Comparable To ASHRAE 62-1989; The Standard Served As The Ventilation Basis In Building Codes Since 1973; OSHA's Ventilation Recommendation For IAQ Will Also Adequately Address ETS; OSHA's Separation Of ETS From General IAQ Has No Basis

OSHA's Proposed Rule for IAQ (to the exclusion of ETS) states that "employers [must] maintain and operate the HVAC system to provide at least the minimum outdoor air ventilation rate, based on actual occupancy, required by the applicable building code, mechanical code, or ventilation code in effect at the time the facility was constructed, renovated, or remodeled, whichever was most recent." 59 Fed Reg. 16026-27. In the foregoing analysis, it was demonstrated that, contrary to OSHA's contention regarding the inapplicability of ventilation to ETS, ASHRAE Standard 62-1989 for Ventilation was specifically designed for, and has been proven successful in, the dilution and removal of ETS constituents. The Standard currently provides ventilation design/operation criteria for building codes in the U.S.

A precursor standard to ASHRAE 62-1989, ASHRAE Standard 62-1973, recommended a ventilation rate of 15 cfm outside

air/person, comparable to the minimum recommended outdoor air rate specified in ASHRAE 62-1989. Standard 62-1973 was approved by the American National Standards Institute (ANSI) and incorporated into building codes. It was in effect through the 1970s. ASHRAE updated Standard 62-1973 in 1981 and provided for two ventilation rates based on smoking and nonsmoking (Standard 62-1981). That Standard did not receive approval from ANSI and was not incorporated into the major building codes in the U.S. ASHRAE 62-1973 thus remained in effect throughout the 1980s as the design and operational criteria document for ventilation in building codes. Many HVAC systems designed and installed over the past 20 years have complied with either ASHRAE 62-1973 or ASHRAE 62-1989 specifications.

Differences in minimum outside air requirements between the two versions of the ASHRAE Standard are not likely to be significant and may, in fact, be identical for certain indoor areas. Thus, compliance with the Proposed Rule's requirements for minimum outdoor air ventilation rates for IAQ, insofar as they are based on the 1973 and 1989 versions of the ASHRAE Ventilation Standard, would be sufficient to satisfy the ventilation requirements for the effective dilution and removal of ETS constituents under ad lib smoking situations. There are no feasibility constraints based on compliance with current building

code specifications for ventilation, as specified in OSHA's general ventilation recommendation for IAQ.

The ASHRAE Standards (62-1973 and 62-1989) designate the outdoor air portion of total supply air, where total supply air equals outside air and return air. The minimum outdoor rates specified in the Standards actually constitute only a fraction of the supply air needed to provide proper heating and cooling. Outside air supply requirements constitute a small percentage of air needed for total supply air. In a case where outside air specifications might differ from current building code requirements, HVAC capacities, as determined by minimum design criteria, are not likely to differ. The assumption that an increase in outside air ventilation rates will incur costs in the redesign and retrofit of an existing ventilation system is not supported.

As OSHA's Proposed Rule on ETS tacitly admits, an enclosed, separately exhausted and negatively pressurized smoking room is neither technologically nor economically feasible as a real option available to all of the nation's employers. 59 Fed Reg. 16016, 16013. As demonstrated above, negative pressurization is feasible using existing exhaust and supply locations in a building. A requirement for a separate exhaust from a smoking area directly to the outside is burdensome, superfluous and dictated only by

OSHA's "zero exposure" doctrine for ETS. Scientific studies and IAQ reports indicate that smoking and nonsmoking areas may share a common air handling system with recirculation of air such that constituents from ETS from smoking areas are not significantly redistributed to nonsmoking areas. This condition can be achieved if the building conforms to the specifications for ventilation rates and filtration recommended by the current ASHRAE Standard for ventilation and by OSHA's own Proposed Rule on IAQ.

REFERENCES

1. ANSI/ASHRAE Standard 62-1989, "Ventilation for Acceptable Indoor Air Quality," American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., ASHRAE, Atlanta, Georgia, 1990.

2. Janssen, John, Statement of ASHRAE, U.S. House Energy and Commerce Subcommittee on Health and the Environment, Washington, D.C., April 10, 1991.

3. Goodfellow, H. and Wyatt, J., "Critical Review of Ventilation Contaminants in Indoor Air," Indoor Air Quality and Ventilation, eds., F. Lunau and G. Reynolds, London, Selper Ltd., 95-104, 1990.

4. Binnie, P., "The Role of Ventilation in Controlling the Quality of Indoor Air, Including ETS," Other People's Tobacco Smoke, ed., A. Armitage, Beverly, East York, United Kingdom, Galen Press, 159-172, 1991.

5. Burroughs, H., "ASHRAE: Addressing the Indoor Air Quality Challenge With Energy Conscious Design," Indoor and Ambient Air Quality, eds., R. Perry and P. Kirk, London, Selper Ltd., 530-535, 1988.

6. Pedelty, J. and Holcomb, C., "A Computer Simulation of Indoor Air Quality Which Models Changes in Point Sources and Ventilation," Environmental Technology 11: 1053-1062, 1990.

7. Sterling, T. and Mueller, B., "Concentrations of Nicotine, RSP, CO and CO_2 in Non-smoking Areas of Offices Ventilated by Air Recirculated From Smoking Designated Areas," Am Ind Hyg Assoc J 49(9): 423-426, 1988.

8. Oldaker, G., et al., "Investigations of Ventilation, Smoking Activity and Indoor Air Quality at Four Large Office Buildings," IAQ '92: Environments for People, Atlanta, ASHRAE, 1992: 248-257.

9. Vaughan, W. and Hammond, K., "Impact of 'Designated Smoking Area' Policy on Nicotine Vapor and Particle Concentrations in a Modern Office Building," J. Air Waste Manage. Assoc. 40: 1012-1017, 1990.

10. Hedge, A., et al., "Building Ventilation and Smoking Policy Effects on Indoor Air Quality and Employee Comfort and

Health," Indoor Air '90, Toronto, Canada, July 29-August 3: 739-744, 1990.

11. Sterling, T. and Mueller, B., "ETS in Offices and When Smoking is Restricted to Designated but Not Separately Ventilated Areas," Indoor Air Quality, ed., H. Kasuga, Springer-Verlag, Berlin, Heidelberg: 120-129, 1990.

12. Hedge, A., et al., "The Effects of Smoking Policy on Indoor Air Quality and Sick Building Syndrome in 18 Air-Conditioned Offices," IAQ 91: Healthy Buildings: 151-159, 1991.

13. Hedge, A., et al., "Effects of Restrictive Smoking Policies on Indoor Air Quality and Sick Building Syndrome: A Study of 27 Air-Conditioned Offices," Indoor Air '93 (1): 517-522, 1993.

14. Broder, I., et al., "Environment and Well-Being Before and Following A Smoking Ban in Office Buildings," Can J Pub Health, 84(4): 254-258, 1993.

15. Proctor, C., et al., "Measurements of Environmental Tobacco Smoke in an Air-Conditioned Office Building," Environ Technol Letters (10): 1003-1018, 1989.

16. Bayer, C. and Black, M., "Thermal Desorption/Gas Chromatographic/Mass Spectrometric Analysis of Volatile Organic Compounds in the Offices of Smokers and Nonsmokers," Biomed and Envir Mass Spect 14(8): 363-367, 1987.

17. Proctor, C., "A Study of the Atmosphere in London Underground Trains Before and After the Ban on Smoking," Toxicology Letters, Proceedings of the International Experimental Toxicology Symposium on Passive Smoking, ed., E. Mohtashamipur, Amsterdam, Elsevier, 131-134, October 23-25, 1986.

18. Nagda, et al., "Airliner Cabin Environment: Contaminant Measurements, Health Risks and Mitigation Options," Geomet Technologies Final Report, U.S. Department of Transportation, 1989.

19. Turner, S., et al., "The Measurement of Environmental Tobacco Smoke in 585 Office Environments," Environment International 18: 19-28, 1992.

20. Lambert, W., et al., "Environmental Tobacco Smoke Concentrations in No-Smoking and Smoking Sections of Restaurants," Am J Pub Health 83(9): 1339-1341, 1993.

21. Hayward, S., et al., "Effectiveness of Ventilation and Other Controls in Reducing Exposure to ETS in Office Buildings," Proceedings of Indoor Air '93, 5: 509-514, 1993.

22. Benda, G., "The New Horizon: Indoor Environmental Quality," Consulting-Specifying Engineer (Invironment) Supplement: June, 1993: 82-104.

23. Light, E. and Gay, R., "Preliminary Assessment of Designated Smoking Areas for Non-Smoker Exposure to Environmental Tobacco Smoke," Indoor Air Quality '93: Operating and Maintaining Buildings for Health, Comfort and Productivity, ASHRAE, Philadelphia, Pennsylvania, November 7-10, 1993. Presentation.